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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,062	03/30/2004	Barin Geoffry Haskell	2777/3293	1313

23838 7590 09/25/2007
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EXAMINER	
HOLDER, ANNER N	
ART UNIT	**PAPER NUMBER**
2621	

MAIL DATE	DELIVERY MODE
09/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/812,062	HASKELL ET AL.
	Examiner	Art Unit
	Anner Holder	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 30 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 17 is objected to because of the following informalities: terms bfst and vbfst should be spelled out or noted in prior claims. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim US 6,862,402 B2.

4. As to claim 1, Kim teaches a rate controller for a video coder, [Fig. 1 (130); Fig. 2] comprising: a target bits computer having inputs for complexity indicators for pictures of source video data, the target bits computer to calculate target bit rates for the pictures therein, [Fig. 2 (309); Col. 5 Line 66 – Col. 6 Line 1] a buffer based quantizer computer to generate a quantizer estimate based on a fullness indicator from a transmit buffer of the video coder, [Fig. 2 (307); Col. 5 Lines 40-43] an activity based quantizer computer, having inputs for the quantizer estimate from the buffer based quantizer computer and for the source video data, to generate a quantizer selection therefrom. [Col. 5 Lines 44-46, 56-62; Col. 6 Lines 6-9]

5. As to claim 2, Kim teaches the rate controller generates a quantizer selection on a picture-by-picture basis. [Abstract; Col. 2 Lines 48-51; Col. 3 Lines 6-7; Col. 5 Line 46]

6. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim US 6,862,402 B2 in view of Ma et al., Rate Control for Advance Video Coding (AVC) Standard, IEEE 2003.

7. As to claim 3, Kim teaches the limitations of claim 1.

Kim does not specifically teach when the picture is an I picture, the target bitrate T_i is determined by: $T_i = \max [R/(1 + (N_P X_P/X_I K_P) + (N_B X_B/X_I K_B)), \text{bitrate}/8 * \text{picture rate}]$, where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures.

Ma teaches when the picture is an I picture, the target bitrate T_i is determined by: $T_i = \max [R\ (1 + (N_P X_P/X_I K_P) + (N_B X_B/X_I K_B)), \text{bitrate}/8 * \text{picture rate}]$, where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Pg. II-893 Col. 2 (4)]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the video rate control teachings of Ma with the encoding device of Kim to achieve coding efficiency. [Ma – Abstract]

8. As to claim 4, Kim (modified by Ma) teaches when the picture is a P picture, the target bitrate T_p is determined by: $T_p = \max [R/(N_P + (N_B K_P X_B)/(KB X_P)), \text{bitrate}/8 * \text{picture rate}]$, where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Ma - Pg. II-893 Col. 2 (4)]

9. As to claim 5, Kim (modified by Ma) teaches when the picture is a B picture, the target bitrate T_b is determined by: $T_b = \max [R/(N_B + (N_P K_B X_P)/(K_P X_B)), \text{bitrate}/8 * \text{picture rate}]$, where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Ma - Pg. II-893 Col. 2 (4)]

10. Claims 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim US 6,862,402 B2 in view of Chung et al. US 5,598,213.

11. As to claim 6, Kim teaches the rate controller of claim 1.

Kim does not specifically teach the buffer based quantizer computer generates its quantizer estimate from a comparison of the fullness indicator to a virtual fullness calculation based on target bit rate calculations and actual bit rates of prior frames.

Chung teaches the buffer based quantizer computer generates its quantizer estimate from a comparison of the fullness indicator to a virtual fullness calculation based on target bit rate calculations and actual bit rates of prior frames. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53]

It would have been obvious at the time the invention was made to incorporate the quantization estimation of Chung with the coding device of Kim to allow for improvement of picture quality.

12. As to claim 7, Kim (modified by Chung) teaches the buffer based quantizer computer comprises: a virtual buffer fullness computer, including storage for target bitrate values, actual bitrate values and picture type assignments of prior coded pictures, a comparator having inputs for the fullness indicator and an output of the virtual buffer fullness computer, and quantizer mapper having an input for an output of the comparator and an output for the quantizer estimate. [Chung - Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53; Col. 6 Lines 5-7; Kim – Col. 4 Lines 56-57]

13. As to claim 8, Kim (modified by Chung) teaches the comparator is a weighted comparator, having an input for a weighting value that determines a relative value adjustment between the fullness indicator and an output of the virtual buffer fullness computer. [Chung - Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53; Col. 6 Lines 5-7]

14. As to claim 9, Kim (modified by Chung) teaches the quantizer mapper comprises a lookup table storing MPEG-based quantizer values. [Kim – Col. 4 Lines 56-57]

15. As to claim 10, Kim (modified by Chung) teaches the quantizer mapper comprises a lookup table storing H.264-based quantizer values. [Kim – Col. 4 Lines 56-57]

16. As to claim 11, Kim teaches A method of generating a quantizer for a new picture to be coded, comprising: calculating a target bitrate for the picture based on the new picture's assigned coding type and complexity indicators of the picture, [Fig. 2 (309); Col. 5 Line 66 – Col. 6 Line 1] estimating a virtual buffer fullness value based on target bitrates and actual coding rates of prior coded pictures of the same type as the new picture. [Fig. 2 (307); Col. 5 Lines 40-43]

Kim does not specifically teach comparing an actual buffer fullness value to the virtual buffer fullness value, and generating a quantizer for the picture in response to the comparison.

Chung teaches comparing an actual buffer fullness value to the virtual buffer fullness value, and generating a quantizer for the picture in response to the comparison. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53]

It would have been obvious at the time the invention was made to integrate the quantization estimation of Chung with the coding device of Kim to allow for improvement of picture quality.

17. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim US 6,862,402 B2 in view of Chung et al. US 5,598,213 and further in view of Ma et al., Rate Control for Advance Video Coding (AVC) Standard, IEEE 2003.

18. As to claim 12, Kim (modified by Chung) teaches method of claim 11.

Kim (modified by Chung) does not specifically teach when the picture is an I picture, the target bitrate T_i is determined by: $T_i = \max [R/(1 +((N_P X_P)/(X_I K_P))+ ((N_B X_B)/ (X_I K_B))),$ bitrate/8 * picture rate], where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures.

Ma teaches when the picture is an I picture, the target bitrate T_i is determined by: $T_i = \max [R/(1 +((N_P X_P)/(X_I K_P))+ ((N_B X_B)/ (X_I K_B))),$ bitrate/8 * picture rate], where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Ma - Pg. II-893 Col. 2 (4)]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the video rate control teachings of Ma with the encoding device of Kim to achieve coding efficiency. [Ma – Abstract]

19. As to claim 13, Kim (modified by Chung and Ma) teaches when the picture is a P picture, the target bitrate T_p is determined by: $T_p = \max [R/((N_P + (N_B K_P X_B)/(KB X_P)),$ bitrate/8 * picture rate], where N_P and N_B respectively represent the number of P and B pictures that appear

in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Ma - Pg. II-893 Col. 2 (4)]

20. As to claim 14, Kim (modified by Chung and Ma) teaches when the picture is a B picture, the target bitrate T_b is determined by: $T_b = \max [R/(N_B + (N_P K_B X_P)/(K_P X_B)), \text{bitrate}/8 * \text{picture rate}]$, where N_P and N_B respectively represent the number of P and B pictures that appear in a group of frames, X_I and X_P respectively represent complexity estimates for the I and P pictures in the group of frames, K_P is a constant, K_B is determined based on the complexity indicators, bitrate represents the number of bits allocated for coding of the group of pictures, and picture rate represents the number of pictures in the group of pictures. [Ma - Pg. II-893 Col. 2 (4)]

21. Claims 15, 18, 21, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. 5,598,213.

22. As to claim 15, Chung teaches a rate control method, comprising: comparing target bitrates of prior coded frames to actual coding bitrates of the frames to generate a virtual transmit buffer fullness indicator, comparing the virtual transmit buffer fullness indicator to an actual transmit buffer fullness indicator, and selecting a quantizer for a current picture based on the comparison of the fullness indicators. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53]

23. As to claim 18, Chung teaches the selecting comprises mapping a fullness value generated from the comparison of fullness indicators to a quantizer according to a lookup table. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53; it is well known in the art to have a quantization table]

24. As to claim 21, Chung teaches a quantizer selection method, comprising: calculating an activity level of a picture from on image information of the picture, adjusting a base quantizer value according to the picture's activity level, and selecting a quantizer value for the picture based on the adjusted quantizer value. [Fig. 3; Col. 5 Lines 5-53]

25. As to claim 23, Chung teaches the adjusting comprises multiplying the base quantizer value by a value of the activity level. [Col. 5 Lines 46-53; Fig. 3]

26. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. 5,598,213 in view of Ozawa et al. (Ozawa) US 6,900,829 B1.

27. As to claim 16, Chung teaches the rate control method of claim 15 and generating an overall fullness indicator representing a comparison of the weighted transmit buffer indicators. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53]

Chung does not specifically teach multiplying by a first weighting factor, multiplying by a second weighting factor.

Ozawa teaches multiplying by a first weighting factor, multiplying by a second weighting factor, generating an overall fullness indicator representing a comparison of the weighted transmit buffer indicators. [Fig. 4; Fig. 5; Fig. 6; Col. 7 Lines 31-49]

It would have been obvious to one of ordinary skill of the art at the time the invention was made to incorporate the weighting teachings of Ozawa with the coding device of Chung enabling coding efficiency and reducing reproduction and coding error.

28. As to claim 17, Chung (modified by Ozawa) teaches w represents the first weighting factor, where $w<1$, the second weighting factor has a value 1-w, and the overall fullness indicator full has a value full = bfst + w(vbfst-bfst), where bfst represents the actual transmit buffer fullness indicator and vbfst represents the virtual transmit buffer fullness indicator. [Fig. 3; Col. 3 Lines 39-59; Col. 4 Lines 9-53; Col. 5 Lines 5-53; Ozawa -Fig. 4; Fig. 5; Fig. 6; Col. 7 Lines 31-49; equations are equivalent - effect the image and use weighting factor]

29. Claims 19, 20, 24, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. 5,598,213 in view of ITU-T H.264 Series H: Audiovisual and Multimedia Systems Infrastructure of audiovisual services - Coding of moving Video Advanced Video coding for generic audiovisual services, 5/2003 (ITU-T).

30. As to claim 19, Chung teaches the rate control method of claim 18.

Chung does not specifically teach the lookup table stores MPEG quantizer values, having a range from 1 to 31.

ITU-T teaches the lookup table stores MPEG quantizer values, having a range from 1 to 31. [Pg. 136, Table 8-13]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the recommendations of the ITU-T standardization with coding device of Chung to provide efficient coding.

31. As to claim 20, Chung (modified ITU-T) teaches the lookup table stores H.264 quantizer values, having a range from 1 to 51. [ITU-T - Pg. 136, Table 8-13]

32. As to claim 24, Chung (modified ITU-T) teaches the selecting comprises mapping the adjusted quantizer value to a value between 1 and 51 for H.264 coding applications. [ITU-T - Pg. 136, Table 8-13]

33. As to claim 25, Chung (modified ITU-T) teaches the selecting comprises mapping the adjusted quantizer value to a value between 1 and 31 for MPEG coding applications. [ITU-T - Pg. 136, Table 8-13]

34. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. 5,598,213 in view of Kim US7,266,148 B2.

35. As to claim 22, Chung teaches the quantizer selection method of claim 21.

Chung does not explicitly teach for a plurality of macroblocks in the picture, calculating variances of image data for a plurality of blocks therein, from minimum variance levels of the macroblocks, calculating minimum activity levels of the macroblocks, and averaging the minimum activity levels of the macroblocks.

Kim teaches for a plurality of macroblocks in the picture, calculating variances of image data for a plurality of blocks therein, from minimum variance levels of the macroblocks,

calculating minimum activity levels of the macroblocks, and averaging the minimum activity levels of the macroblocks. [Fig.3; Col. 7 Lines 43-50]

It would have been obvious to one of ordinary skill in the art at the time of the invention to infuse the activity calculation of Kim with the coding device of Chung to improve the picture quality and maintain coding efficiency.

Conclusion

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fujishiro et al. (US 6,269,123 B1); Singhal et al. (US 5,333,012); Chen (US 6,385,242 B1); Lim (US 5,638,126); Choi (US 5,822,461).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anner Holder whose telephone number is 571-270-1549. The examiner can normally be reached on M-Th, M-F 8 am - 3 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ANH 9/12/07

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TC 2600